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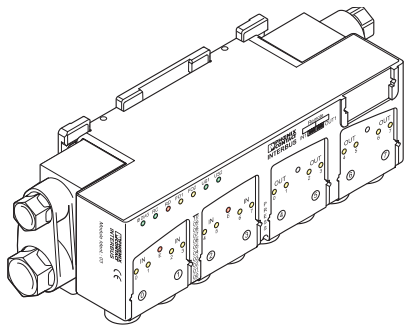
# IBS RL 24 DIO 8/8/8-R-LK(-2MBD)

## Digital Input/Output Module With Eight Inputs and Eight Outputs That Can Be Read



Data Sheet 636901 05/2003

### Product Description

The module is designed for use in systems engineering. With IP67 protection, it is suitable for use without a control cabinet in harsh industrial conditions. It can, for example, be used on the tool platform, directly on welding robots or in conveying systems.

The module is available in two different versions with different transmission rates:

– IBS RL 24 DIO 8/8/8-R-LK (500 kbaud)
– IBS RL 24 DIO 8/8/8-R-LK-2MBD (2 Mbaud)

A mixed operation of modules with different transmission rates is not permitted.

### Features

– INTERBUS protocol (EN 50254)
– IP67 protection
– Optical fiber bus connection
– QUICKON connectors for connecting the supply voltage
– Sensors and actuators are connected using 5-pos. M12 female connectors
– Installation options:
  directly to the welding robot
  on aluminum profiles
  two-position attachment
  direct mounting

### Note

This data sheet is only valid in association with the "Configuring and Installing the Rugged Line Product Range" User Manual
IBS RL SYS PRO UM E.

Please note that the bus connectors and the mounting plate are not supplied as standard (see ordering data on page 19).

Only connect and remove the bus connectors with the power switched off (connection according to DIN EN 60204-1:1993-06).

To ensure IP67 protection you must note the following points:

– The bus connectors must be connected.
– You must not pierce the grommet of unused bus connectors. (For example, some connectors are not used if the module is the last device in the bus.)
– Cover unused M12 female connectors with protective caps.

Only power supply units with safe isolation should be used.

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## Connector Pin Assignment

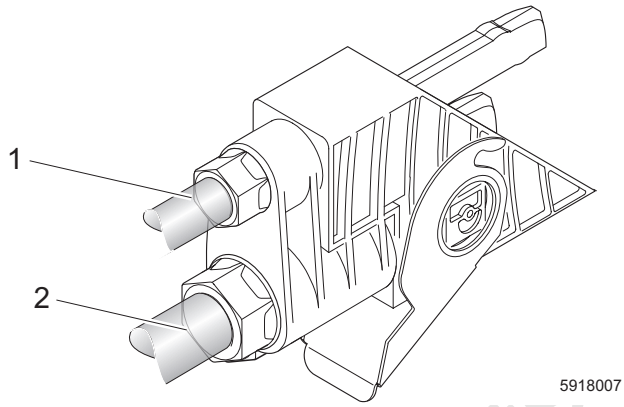


Figure 1 Connector pin assignment of the INTERBUS remote bus and the power supply

**1** INTERBUS remote bus (optical fiber)

**2** $U_{S1}/U_{S2}$ power supply
$U_{S1}$ = bus/sensor supply
$U_{S2}$ = actuator supply

The contact rating for all $U_{S1}$ and $U_{S2}$ contacts is 16 A each.

For additional information about the connector pin assignment and assembly, please refer to the IBS RL SYS PRO UM E User Manual.

**INTERBUS remote bus**

| Pos. in Figure 1 | Bus Connector | Signal | Direction | Splice Ring | Wire Color |
|---|---|---|---|---|---|
| 1 | Incoming bus | Optical fiber Remote IN | Receive data | IN | Orange |
| | | | Send data | OUT | Black |
| | Outgoing bus | Optical fiber Remote OUT | Receive data | IN | Black |
| | | | Send data | OUT | Orange |

**$U_{S1}/U_{S2}$ power supply**

| Pos. in Figure 1 | Signal | Connection | Wire Color | Designation |
|---|---|---|---|---|
| 2 | +24 V $U_{S1}$ | 1 | Black | 1 |
| | GND $U_{S1}$ | 2 | Black | 2 |
| | +24 V $U_{S2}$ | 3 | Black | 3 |
| | GND $U_{S2}$ | 4 | Black | 4 |
| | Functional earth ground | 5 | Yellow | 5 |

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## Connection of Inputs and Outputs

Two inputs are assigned to each of the female connectors 0 to 3; two outputs are assigned to female connectors 4 to 7.

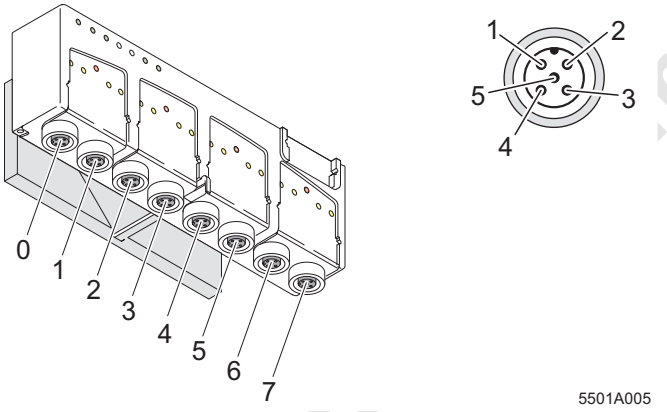


Figure 2 Pin assignment of 5-pos. M12 female connectors (1)

| Pin | Female Connector 0 | Female Connector 1 | Female Connector 2 | Female Connector 3 | Female Connector 4 | Female Connector 5 | Female Connector 6 | Female Connector 7 |
|---|---|---|---|---|---|---|---|---|
| 1 | $U_{S1}$-1 V (sensor supply) | | | | GND $U_{S2}$ | | | |
| 2 | IN1 | IN3 | IN5 | IN7 | OUT1 | OUT3 | OUT5 | OUT7 |
| 3 | GND $U_{S1}$ | | | | GND $U_{S2}$ | | | |
| 4 | IN0 | IN2 | IN4 | IN6 | OUT0 | OUT2 | OUT4 | OUT6 |
| 5 | Functional earth ground | | | | | | | |

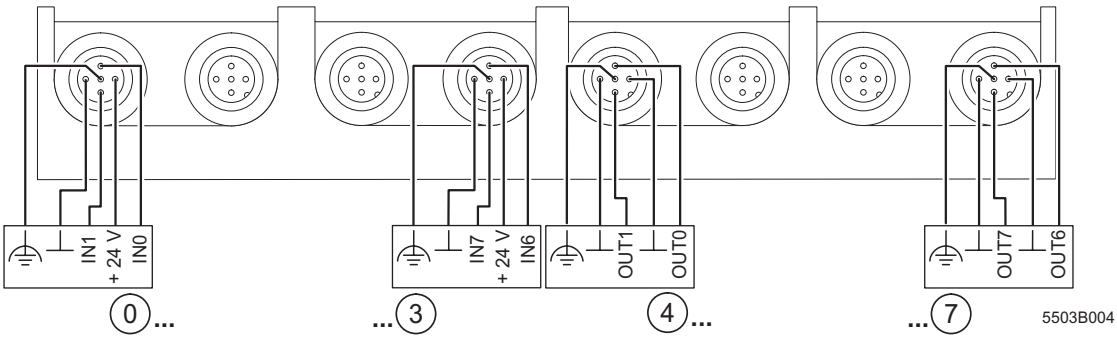


Figure 3 Pin assignment of 5-pos. M12 female connectors (2)

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## Electrical Isolation

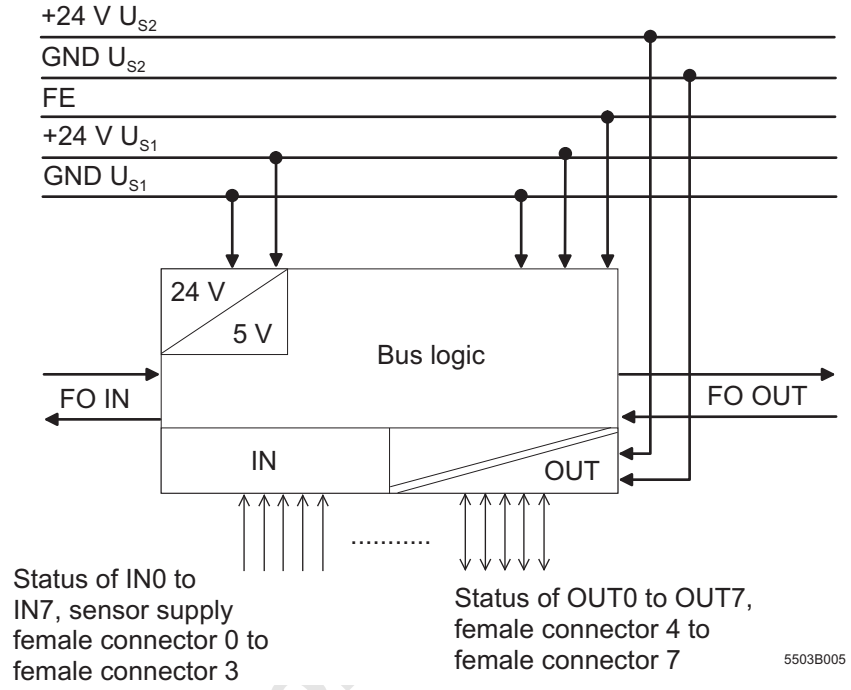


Figure 4 Block diagram

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# Programming Data

| | |
|---|---|
| ID code | $3_{hex}$ ($03_{dec}$) |
| Length code | $01_{hex}$ ($01_{dec}$) |
| Input address area | 2 bytes |
| Output address area | 2 bytes |
| Parameter channel (PCP) | Not present |
| Register length | 2 bytes |

### Error Messages

– The failure of the sensor supply for a group of four inputs is indicated to the control or computer system via the bus and is stored in the module.
– The bus delivers a short circuit or overload message to the control or computer system, which is stored in the module.
– If the output data does match the input data, this is indicated to the control or computer system via the bus and is stored in the module.
– The bus indicates to the control or computer system that the supply voltage $U_{S1}$ has dropped below the permissible range.
– Upon delivery the module is set up so that errors concerning the supply voltage $U_{S1}$, the sensor supply or the outputs are indicated via the bus.
– If the supply voltage $U_{S2}$ is not present or is below the permissible voltage range this is not indicated but only displayed by the US2 LED. In this case, the diagnostics of the outputs is deactivated. Temporarily stored diagnostic information remains stored. The diagnostics function can only be acknowledged once the supply voltage US2 is within the permissible range.
– The error messages are reset through acknowledgment in the control or computer system.
– The configuration data and the error messages (except for undervoltage diagnostics) are only stored in the volatile memory of the module. Configuration data and error messages are deleted when the power is reset.

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# INTERBUS Process Data

### Assignment of the Inputs to the INTERBUS Input Data Word

| (Byte.bit) view | Byte | Byte 0 | | | | | | | | Byte 1 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Module | Slot | 3 | | 2 | | 1 | | 0 | | 7 | | 6 | | 5 | | 4 | |
| | Input | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
| | | Status input 0 to 7 | | | | | | | | Status output 0 to 7 | | | | | | | |

### Assignment of the Outputs to the INTERBUS Output Data Word

| (Byte.bit) view | Byte | Byte 0 | | | | | | | | Byte 1 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Module | Slot | 7 | | 6 | | 5 | | 4 | | Not used | | | | | | | |
| | Output | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | | | | | | | | |
| | | Status output 0 to 7 | | | | | | | | | | | | | | | |

For the assignment of the illustrated (byte.bit) view for your control or computer system, please refer to data sheet DB GB IBS SYS ADDRESS, Part No. 90 00 99 0.

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## Diagnostic and Status Indicators

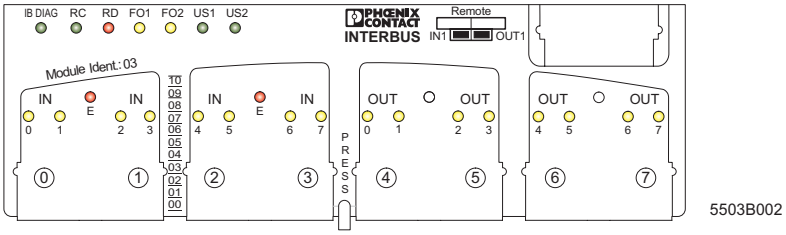


Figure 5 Positions of the diagnostic and status indicators

| | | |
|---|---|---|
| **IB DIAG** | Green LED | INTERBUS diagnostics |
| | OFF: | Supply voltage not present |
| | Flashing at 0.5 Hz: | Supply voltage present, bus not active |
| | Flashing at 2 Hz: | Supply voltage present, I/O error |
| | ON: | Supply voltage present, bus active, no I/O error |
| **RC** | Green LED | Remote bus cable check |
| | ON: | Incoming remote bus connection established |
| | OFF: | Incoming remote bus connection defective or not active |
| **RD** | Yellow LED | Remote bus status (remote bus disabled) |
| | ON: | Outgoing remote bus switched off |
| **FO1** | Yellow LED | Monitoring the incoming optical fiber path |
| | ON: | Incoming optical fiber path not OK |
| | OFF: | Incoming optical fiber path OK or not used |
| **FO2** | Yellow LED | Monitoring the outgoing optical fiber path |
| | ON: | Outgoing optical fiber path not OK |
| | OFF: | Outgoing optical fiber path OK or not used |

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| | | |
|---|---|---|
| **US1** | Green LED<br>OFF:<br>Flashing:<br>ON: | Monitoring the supply voltage $U_{S1}$<br>$U_{S1}$ not present<br>$U_{S1}$ below the permissible voltage range<br>$U_{S1}$ present |
| **US2** | Green LED<br>Flashing:<br>ON: | Monitoring the supply voltage $U_{S2}$<br>$U_{S2}$ below the permissible voltage range/not present<br>$U_{S2}$ present |
| **E** | Red LED<br>ON: | Error message<br>Short-circuit of the sensor supply for a group of four inputs. (This error message is stored temporarily on the module. However, the error message is stored in volatile memory and will be lost after a power reset.) |
| **IN 0 - 7** | Yellow LED<br>ON:<br>OFF: | Status per input<br>Input at logic 1<br>Input at logic 0 |
| **OUT 0 - 7** | Yellow/red LED<br>Yellow:<br>OFF:<br>Red: | Status per output<br>Output at logic 1<br>Output at logic 0<br>Short circuit/overload of an output; OUT process data does not match IN process data.<br>(This error message is stored temporarily on the module. However, the error message is stored in volatile memory and will be lost after a power reset.) |
| | Yellow/red | Permissible mixed optical operation<br>(Outputs at logic 1; buffered error)<br>See also „Error Messages“ on page 5. |

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### I/O error messages

| Error Message | Switching Threshold | System Message With Deactivated Single-Channel Diagnostics | System Message With Activated Single-Channel Diagnostics | Indicator on the Device |
|---|---|---|---|---|
| Undervoltage $U_{S1}$ | ≤ 16.3 V DC | I/O error* | Diagnostic parameter register 2** | $U_{S1}$ LED; current process image |
| Missing voltage/ undervoltage $U_{S2}$ | ≤ 16.3 V DC | Default: no error; optional: I/O error* | Default: no error; diagnostic parameter register 2** | $U_{S2}$ LED; current process image |
| Short circuit/ overload initiator supply | ≥ 0.7 A DC | I/O error* | Diagnostic parameter register 2** | Group-specific E LED for 4 inputs; volatile buffer |
| Short circuit/ overload<br>External voltage supply at the output | ≥ 2.6 A DC<br>≥ 10.7 V DC for deactivated output | I/O error* | Diagnostic parameter register 2** | Red LED per output; volatile buffer |
| See also „Error Messages“ on page 5 | | | | |
| * See also IBS SYS FW G4 UM E | | | | |
| ** See also IBS RL SYS PRO UM E | | | | |

### System messages

| Error Message | Switching Threshold | System Message | Indicator on the Device |
|---|---|---|---|
| Deterioration of optical transmission at the incoming interface | Optical system reserves reached at -20.6 dBm, maximum | MAU warning | FO1; current process image |
| Deterioration of optical transmission at the outgoing interface | Optical system reserves reached at -20.6 dBm, maximum | MAU warning | FO2; current process image |

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# Housing Dimensions

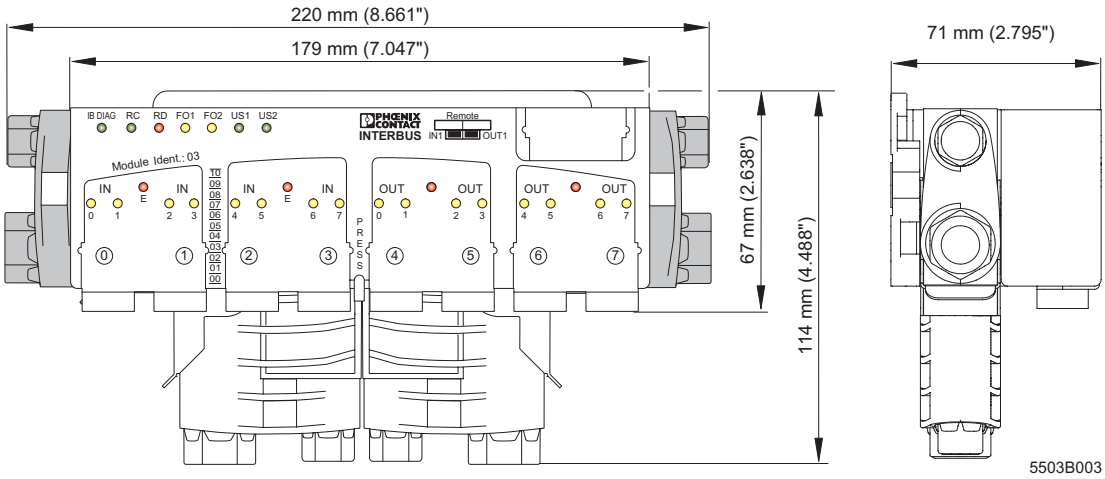


Figure 6 Housing dimensions

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# Technical Data

| General Data | |
|---|---|
| Ambient temperature | Operation: -20°C to +55°C (-4°F to +131°F)<br>Storage/transport: -25°C to +70°C<br>(-13°F to +158°F) |
| Humidity | Operation: 100%<br>Storage/transport: 95%, no condensation |
| Air pressure | Operation: 860 hPa to 1080 hPa<br>(up to 1500 m [4921 ft.] above sea level)<br>Storage/transport: 660 hPa to 1080 hPa<br>(up to 3500 m [11483 ft.] above sea level) |
| Degree of protection | IP67 (DIN 40050, IEC 60529), when installed<br>Seal unused slots/connections to ensure the degree of protection. |
| Class of protection | 3 according to VDE 106, IEC 60536 |
| Material | Zinc die-cast,<br>copper and nickel-plated surface |
| Electrical isolation | Between bus logic and outputs, test voltage 500 V AC, 50 Hz, 1 min. |
| Housing dimensions (width x height x depth) | 220 mm x 114 mm x 71 mm<br>(8.661 in. x 4.488 in. x 2.795 in.)<br>(with bus connectors and mounting plate) |
| Weight | Approximately 790 g<br>(without connector and mounting plate) |

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| Supply Voltage $U_{S1}$ (Bus Logic) | |
|---|---|
| Nominal voltage | 24 V DC |
| Permissible range | 18.5 V DC to 32 V DC (ripple included) |
| Ripple | 3.6 $V_{PP}$ |
| Nominal current consumption | 120 mA, typical, plus supply current for the sensors |
| Surge voltage protection | 35 V (0.5 s) |
| Protection against polarity reversal | Yes (parallel diode),<br>with external 5 A slow-blow fuse |
| Provide the module with an external fuse to protect it against polarity reversal. The power supply unit must be able to supply at least four times the rating of the external fuse. | |
| External fuse | 16 A slow-blow, maximum |
| When using the module for the first time in the Rugged Line system protect the supply voltage using a 5 A fuse. If all the modules are correctly connected in the system, the 5 A fuse can be replaced by a 16 A fuse. The system can then be loaded with up to 16 A. | |
| When working on the supply voltage ensure that the protection against polarity reversal is only present if the Rugged Line system is protected with a 5 A fuse. | |
| The voltage $U_{S1}$ is looped through and can be tapped off at the connector for the outgoing remote bus. The maximum continuous current is 16 A. | |

| Supply Voltage $U_{S1}$ (Sensor Voltage) | |
|---|---|
| The sensors are supplied in groups of four via a short-circuit-proof sensor supply. | |
| Nominal voltage | $U_{S1}$ minus 1 V |
| Current consumption | 400 mA total current for all inputs<br>(50 mA per input) |
| Protection | Electronic overload/short circuit protection per group (each group comprises 4 inputs) |
| Response time for the<br>short circuit diagnostic message | 3 to 5 seconds |

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| Supply Voltage $U_{S2}$ (Actuator Voltage) | |
|---|---|
| Nominal voltage | 24 V DC |
| Permissible voltage range | 18.5 V DC to 32 V DC (ripple included) |
| Ripple | 3.6 $V_{PP}$ |
| Nominal current consumption | 4 A, maximum |
| Concurrent channel derating | None |
| Surge voltage protection | 35 V (0.5 s) |
| Protection against polarity reversal | Yes (parallel diode),<br>with external 5 A slow-blow fuse |
| Provide the module with an external fuse to protect it against polarity reversal. The power supply unit must be able to supply at least four times the rating of the external fuse. | |
| External fuse | 16 A slow-blow, maximum |
| When using the module for the first time in the Rugged Line system protect the supply voltage using a 5 A fuse. If all the modules are correctly connected in the system, the 5 A fuse can be replaced by a 16 A fuse. The system can then be loaded with up to 16 A. | |
| When working on the supply voltage ensure that the protection against polarity reversal is only present if the Rugged Line system is protected with a 5 A fuse. | |
| The voltage $U_{S1}$ is looped through and can be tapped off at the connector for the outgoing remote bus. The maximum continuous current is 16 A. | |

| INTERBUS Interface | |
|---|---|
| Incoming remote bus | Optical fiber<br>(polymer fiber 980 µm/1000 µm) |
| Outgoing remote bus | Optical fiber<br>(polymer fiber 980 µm/1000 µm) |
| Transmission rate | |
| IBS RL 24 DIO 8/8/8-R-LK | 500 kbaud |
| IBS RL 24 DIO 8/8/8-R-LK-2MBD | 2 Mbaud |

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| Digital Inputs IN0 to IN7 | |
|---|---|
| Number of inputs | 8 |
| Electrical isolation | No isolation between I/O devices and bus logic<br>Electrical isolation to the digital outputs, test voltage 500 V AC, 50 Hz, 1 min. |
| Input voltage | DIN EN 61131-2<br>Permissible range 0 signal: -30 V to +5 V<br>Permissible range 1 signal: 11 V to 30 V |
| Input type | 1 (DIN EN 61131-2) |
| Input current | 3 mA, typical |
| Permissible residual current 0 signal: | < 1.0 mA, typical |
| Delay time 0 → 1 | 1.5 ms, typical |
| Delay time 1 → 0 | 3.5 ms, typical |

| Input Characteristic Curve | |
|---|---|
| **Input Voltage (V)** | **Typical Input Current (mA)** |
| $-30 < U_{IN} < 0.7$ | 0 |
| 3 | 0.31 |
| 6 | 0.64 |
| 9 | 1.12 |
| 12 | 1.64 |
| 15 | 2.17 |
| 18 | 2.71 |
| 21 | 3.23 |
| 24 | 3.77 |
| 27 | 4.30 |
| 30 | 4.83 |

| Typical Switching Thresholds for Inputs | | |
|---|---|---|
| **Signal Transition** | **Input Voltage (V)** | **Typical Input Current (mA)** |
| 0 → 1 | 8.41 | 1.0 |
| 1 → 0 | 8.41 | 1.0 |

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| Digital Outputs OUT0 to OUT7 | |
|---|---|
| Number | 8 |
| Nominal output voltage $U_{OUT}$ | 24 V DC |
| Differential voltage for $I_{nom}$ | ≤ 0.1 V |
| Coincidence limitation of outputs | None |
| Nominal current $I_{nom}$ | 0.5 A |
| Total current | 4 A |
| Protection | Short circuit; overload |
| Nominal load | |
| Ohmic | 48Ω /12 W |
| Lamp | 12 W |
| Inductive | 12 VA (1.2 H, 48 Ω) |
| Signal delay upon power up of | |
| - Ohmic nominal load | 300 µs, typical |
| - Lamp nominal load | 300 µs, typical |
| - Inductive nominal load | 300 µs (1.2 H, 48 Ω), typical |
| Signal delay upon power down of | |
| - Ohmic nominal load | 500 µs, typical |
| - Lamp nominal load | 500 µs, typical |
| - Inductive nominal load | 500 µs (1.2 H, 48 Ω), typical |
| Switching frequency with | |
| - Ohmic nominal load | 1 kHz, maximum |
| This switching frequency is limited by the selected data rate, the number of bus devices, the bus structure, the software, and the control or computer system used. | |
| - Lamp nominal load | 1 kHz, maximum |
| This switching frequency is limited by the selected data rate, the number of bus devices, the bus structure, the software, and the control or computer system used. | |
| - Inductive nominal load | 2 Hz (1.2 H, 12 Ω), maximum |
| Overload response | Auto restart |
| Response time with ohmic overload (12 Ω, 25°C [77°F]) | < 50 ms |
| Inductive overload response | Output may be damaged |

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| Digital Outputs OUT0 to OUT7 | |
|---|---|
| Reverse voltage endurance against short pulses | Protection up to 3 A DC |
| Strength against permanently applied surge voltage | No |
| Limitation of the demagnetization voltage induced on circuit interruption | ≥ -7 V |
| Overcurrent shutdown | At 2.6 A, minimum |
| Output current when switched off | = 0 V |
| Output voltage when switched off | 500 mV, maximum |
| Output current with ground connection interrupted | = 0 A |
| Switching power with ground connection interrupted | = 0 W |

| Output Characteristic When Switched On (Typical) | |
|---|---|
| **Output Current (A)** | **Differential Output Voltage (V)** |
| 0 | 0 |
| 0.1 | 0.020 |
| 0.2 | 0.035 |
| 0.3 | 0.050 |
| 0.4 | 0.065 |
| 0.5 | 0.080 |

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## Conformance with EMC Directive

| Conformance With EMC Directive 89/336/EEC | | |
|---|---|---|
| **Noise Immunity Test According to EN 50082-2** | | |
| Electrostatic discharge (ESD) | EN 61000-4-2<br>IEC 61000-4-2 | Class 3, Criterion B |
| Electromagnetic fields | EN 61000-4-3<br>IEC 61000-4-3 | Criterion A, field strength 10 V/m |
| Fast transients (burst) | EN 61000-4-4<br>IEC 61000-4-4 | Class 4, Criterion B |
| Surge voltage | EN 61000-4-5<br>IEC 61000-4-5 | Class 2, Criterion B |
| Conducted interference | EN 61000-4-6<br>IEC 61000-4-6 | Criterion A, test voltage 10 V |
| **Noise Immunity Test According to NAMUR NE 21** | | |
| Immunity to interference | NAMUR NE 21 | Voltage dips 0 ms to 20 ms,<br>repeat rate 1 s, Criterion 1 |
| **Noise Emission Test According to EN 50081-2** | | |
| Noise emission | EN 55022 | Class B, residential |

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### Technical Data for the Optical Fiber Interface

| Optical Power Level | | |
|---|---|---|
| Cable type | PSM-LWL-RUGGED-980/1000 PSM-LWL-KDHEAVY-980/1000 | PSM-LWL-RUGGED-FLEX-980/1000 |
| Maximum fiber attenuation at 660 nm LED measurement | 230 dB/km | 280 dB/km |
| Typical fiber attenuation at 660 nm LED measurement | 200 dB/km | 250 dB/km |
| Transmission distance[a] | <50 m (164.042 ft.) | <35 m (114.829 ft.) |
| Minimum transmission distance | 1 m (3.281 ft.) | 1 m (3.281 ft.) |
| Optical output power at 25°C (77°F) | -4.9 dBm, typical | |
| Maximum optical output power at 25°C (77°F) | -2 dBm | |
| Optical output power (0°C to 55°C [32°F to 131°F]) | -5.8 dBm, typical | |
| Minimum optical receiver responsivity (0°C to 55°C [32°F to 131°F]) | -20.6 dBm | |
| Optical overrange at 25°C (77°F) | > -2 dBm | |
| Available attenuation (0°C to 55°C [32°F to 131°F]) | 14.8 dB | |
| Maximum wavelength (0°C to 55°C [32°F to 131°F]) | 660 nm | |
| System reserve | 3 dB | |
| Available attenuation for optical fibers | 11.8 dB | |

a. Transmission distances of < 1 m (3.281 ft.) are only permitted with Phoenix Contact's special pre-assembled cable jumper IBS RL CONNECTION-LK.

| Technical Data for the Cables | | |
|---|---|---|
| Cable type | PSM-LWL-RUGGED-980/1000 PSM-LWL-KDHEAVY-980/1000 | PSM-LWL-RUGGED-FLEX-980/1000 |
| Attenuation for 660 nm LED (< 30 nm HWB) | 230 dB/km | 280 dB/km |
| Retractive index profile | Step index | |
| Core diameter | 980 µm | |
| Cladding diameter | 1000 µm | |
| Numerical aperture | 0.47 ±0.03 | |
| Individual covering | PA | |

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## Ordering Data

| Description | Order Designation | Order No. |
|---|---|---|
| Digital input/output module (500 kbaud) with outputs that can be read back | IBS RL 24 DIO 8/8/8-R-LK | 27 34 16 7 |
| Digital input/output module (2 Mbaud) with outputs that can be read back | IBS RL 24 DIO 8/8/8-R-LK-2MBD | 27 34 51 0 |
| Bus connector (2 pcs. needed) | IBS RL PLUG-LK/POF | 27 31 07 6 |
| Mounting plate | IBS RL AP | 27 31 12 8 |
| Labeling fields (set of 50 pcs.) | IBS RL MARKER-SET | 27 32 72 9 |
| Protective caps (5 pcs.) for unused M12 female connectors | IBS IP PROT IO | 27 59 91 9 |
| "Configuring and Installing the Rugged Line Product Range" User Manual | IBS RL SYS PRO UM E | 27 43 78 9 |
| 4-pos. sensor connector with QUICKON connection for M12 female connectors | SACC-M12MS-4QLCON | 16 40 22 3 |
| Optical fiber data cable: Polymer fiber cable, duplex, 980/1000 µm, sold by the meter, not pre-assembled | PSM-LWL-RUGGED-980/1000 | 27 44 32 2 |
| Optical fiber data cable (flexible): Polymer fiber cable, duplex, 980/1000 µm, dark red, welding-splash-resistant in standard applications; tested for flexible cable tracks, sold by the meter, cable is not pre-assembled | PSM-LWL-RUGGED-FLEX-980/1000 | 27 44 33 5 |
| Optical fiber data cable: Polymer fiber cable, duplex, 980/1000 µm, , sold by the meter, not pre-assembled | PSM-LWL-KDHEAVY-980/1000 | 27 44 31 9 |
| Assembled cable jumper for the short connection of the Rugged Line devices with two optical fiber bus connectors (remote bus and supply voltage) | IBS RL CONNECTION-LK | 27 33 02 9 |
| Supply cable, 5 x 1.5 $mm^2$ (16 AWG), gray, very flexible, welding splash-resistant in standard applications | IBS PWR5 HD/F | 27 31 77 5 |
| Supply cable, 5 x 1.5 $mm^2$ (16 AWG) | IBS PWR/5 | 28 20 00 0 |

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| Description (Continued) | Order Designation | Order No. |
|---|---|---|
| Adapter for remote bus connection from optical fiber to copper (circular connector) | IBS RL 24 ADAP-LK/T | 27 25 04 0 |
| Adapter for remote bus connection from copper (circular connector) to optical fiber | IBS RL 24 ADAP T/LK | 27 25 03 7 |
| Adapter for an INTERBUS remote interface (9-pos. D-SUB) to polymer fiber (F-SMA) | IBS OPTOSUB-MA/M/R-LK-OPC | 27 32 63 5 |

Make sure you always use the latest documentation.
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Phoenix Contact GmbH & Co. KG
Flachsmarktstr. 8
32825 Blomberg
Germany

+ 49 - (0) 52 35 - 3-00
+ 49 - (0) 52 35 - 3-4 12 00
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